Increase Arrivals/Departures at High-Density Airports

Summary Description:

The Increase Arrivals/Departures at High-Density Airports solution set involves airports (and the airspaces that access those airports) in which:

- Demand for runway capacity is high
- There are multiple runways with both airspace and taxiing interactions, or
- There are close-proximity airports with the potential for airspace or approach interference.

The above-defined airports require all the capabilities of the flexible terminals and airspace plus integrated tactical and strategic flow capabilities. They may require higher performance navigation and communications capabilities for air traffic and the aircraft to support these additional operational requirements.

Background:

With increasing demand, an even greater need exists to achieve and maintain peak through-put performance at the busiest airports and in the busiest airspace. Capability improvement via new procedures to enhance airport surface movements, reduce spacing and separation requirements, and improve overall traffic flow management into and out of busy metropolitan airspace is needed to maximize traffic flow and airport usage.

Operations are conducted to achieve maximum throughput, while facilitating efficient arrival and departure profiles. Traffic Flow Management and overall planning for the entire airport complex are helping to achieve higher airport throughput, ensuring that arrival flows match the projected airport capacity.

Operational Capability Description:

High-density corridors will provide transitions to and from trajectory-based en route airspace. High-density operations will seamlessly integrate surface operations through transition altitudes to en route airspace. As illustrated in Figure 1a, aircraft arriving from all directions receive specific 4 dimensional (4D) Trajectory profiles via data communications as early as possible. As routes converge approaching the airport, arriving traffic conduct airborne spacing and merging procedures that reduce excess spacing between aircraft and maximize throughput. Air Navigation Service Provider (ANSP) personnel provide overall tactical separation in this airspace, making full use of aircraft capabilities. Wake vortex detection, tracking, dissipation, and prediction information is also provided to controllers, as well as arriving and departing aircraft, in the terminal area.

Depending on runway configuration at high-density airports, various arrival procedures may be employed. Specific configurations and routes will be chosen in near-real time to provide flexibility and maximize arrival and departure throughput, even when severe weather is present. Required Navigation Performance (RNP) and Area Navigation (RNAV) routes will be prevalent, allowing for closer route spacing than is available today. In trail aircraft

approaching a single runway will achieve and maintain optimum spacing via airborne spacing procedures. Aircraft approaching closely spaced parallel runways may conduct parallel runway procedures. Other “equivalent visual” approach procedures may also be developed to remove the restrictions currently imposed during times of limited visibility and ceilings. At high-density airports, precision approaches will be available to every runway. Low-visibility landing procedures will also be conducted.

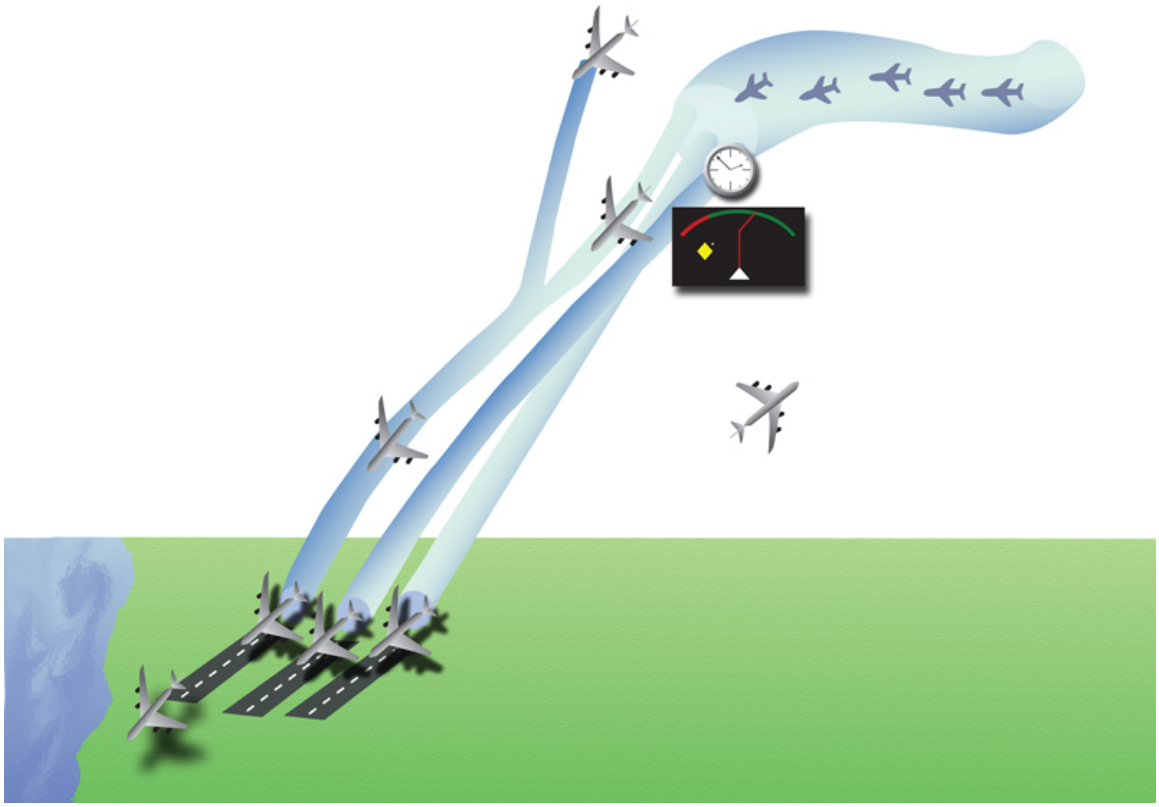

Figure 1a

High-density operations may be required at more than today’s Class B airports to handle the projected traffic increase; however, as high-density operations restrict access to high-capability aircraft, high-density operations will only be designated when warranted by demand (e.g., some airports may be high-density during peak traffic hours but not otherwise). Satellite airport operations will be incorporated into high-density operations if demand or operational conditions warrant. Otherwise, access will be provided via negotiation of an appropriate 4D trajectory.

Taxi operations will be integrated into an aircraft’s 4D trajectory, allowing the ANSP to complete capacity management and flow contingency management activities and provide streamlined departure management. Cockpit and ground automation will allow aircraft to plan for crossing active runways, and allow taxi across when the runway is clear, without tower intervention. Near-real time

updates for airport surface maps (e.g. taxiway or runway closures) will be available to pilots via data communications.

The same level of shared situational awareness and collaborative planning between the ANSP and operators applied to high-density surface operations will be applied to the aircraft in flight. This will enable much more efficient use of airport facilities, such as gates, taxiways, ramps, fuel trucks, and deicing facilities than currently possible.

To accommodate high-density procedures, advanced technology may enable reduced same-runway separation standards and runway occupancy rules. These modifications may include use of active wake vortex detection systems and automated aircraft braking systems that could optimize brake application to safely reach a pre-coordinated runway exit. (Safety analysis will determine whether any of the preceding concepts can be safely implemented, both generally and at specific airports and runway ends.)